Battle Command Advanced Warfighting Experiments

Summary of April 1994 Experiments

Monograph by

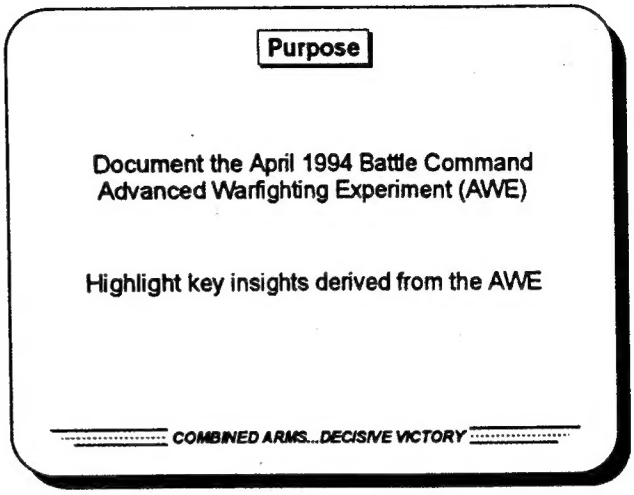
Michael C. Ingram

TRADOC Analysis Center
Study and Analysis Center
Study Directorate
(913) 684-9170

22 November 1994

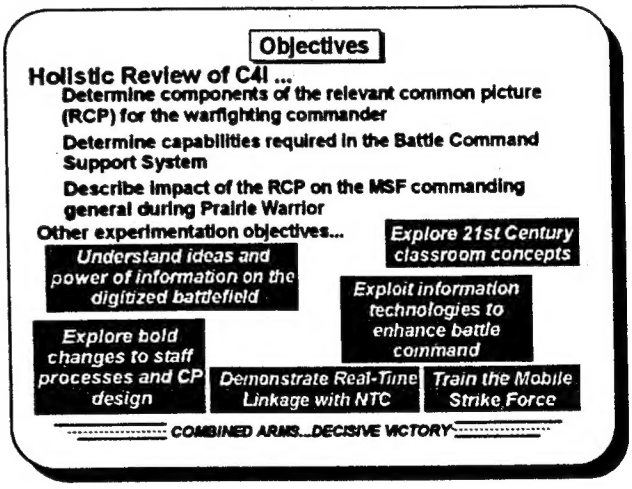
Battle Command Advanced Warfighting Experiments
Summary of April 1994 Experiment

Purpose



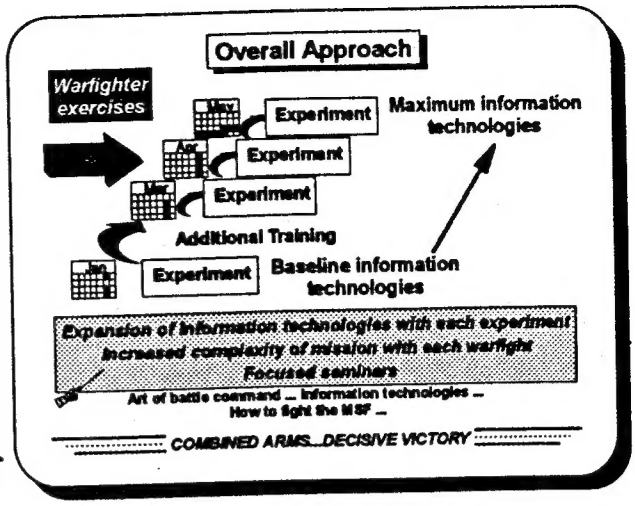
This interim report describes activities during the third of several advanced warfighting experiments (AWEs) conducted by the Battle Command Battle Laboratory (BCBL) at Fort Leavenworth, Kansas. The experiments are aimed at advancing the art of battle command, and are designed within the context of two activities associated with the U.S. Army Command and General Staff College (CGSC). These activities are the Battle Command Elective (BCE), a pilot course developed jointly by BCBL and CGSC, and the Prairie Warrior student exercise conducted by the college in May 1994. In addition to a brief background on the experimentation process and a description of the April 1994 events, the report also provides emerging insights from this third AWE. The report was prepared by the Training and Doctrine Command (TRADOC) Analysis Center (TRAC) in support of BCBL.

Objectives



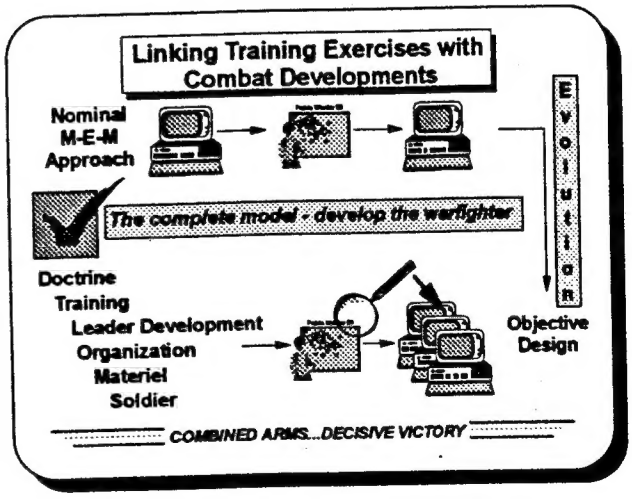
While the AWEs address several objectives, the principal focus continues to be to support investigation of the Louisiana Maneuvers (LAM) issue assigned to BCBL, Holistic Review of Command, Control, Communications, Computers, and Intelligence (C4I). An implied task under this issue requires BCBL to develop and deliver the relevant common picture (RCP) of the battlefield for the warfighting commander, determine the modifications to the Battle Command Support System (BCSS) required to deliver this RCP, and discuss the impact of the RCP on a surrogate division commander. These are the primary objectives of the analytic support effort, and the other elements shown here are addressed to the extent that they support those principal goals or extend the vision for battle command experimentation. Unique to this experiment was a demonstrated real-time linkage with the National Training Center (NTC).

Overall Approach



BCBL's initial concept called for five AWEs to be held from January through May 1994, one each month. The February AWE was cancelled to accommodate additional training required for the spectrum of technology used in the AWEs. Associated with each AWE is a warfighting exercise providing a set-piece to explore the RCP. The experiments during the first four months comprise the BCE, and the May experiment is a subset of the Prairie Warrior exercise. The exercises began from a baseline of information technology and have moved toward a digitized force, to investigate and identify components of the RCP and useful capabilities to contribute to the development of that picture. CGSC students are participants in the experiment, providing the commander, key leaders, and staff of an organization known as the Mobile Strike Force (MSF). This experimental force will be used by the Army to develop future concepts and organizations leading the Army to the 21st century, through interaction with leaders who will be senior Army leaders in the time frame when such a force might be fielded. In this series of experiments, the MSF is characterized as a 1998+ force. In each AWE, the MSF staff receives a mission order, and must develop plans to execute their assigned mission. The MSF Commander directs battle operations from a forward command post (CP), with selected key staff members; the remainder of the headquarters staff is located in a rearward CP, and conducts planning in that cell. Subordinate commanders within the MSF are also physically segregated from the forward and rearward CPs. In addition to the warfighting exercises, a series of seminars provides information on battle command, information technologies, and warfighting concepts for the MSF.

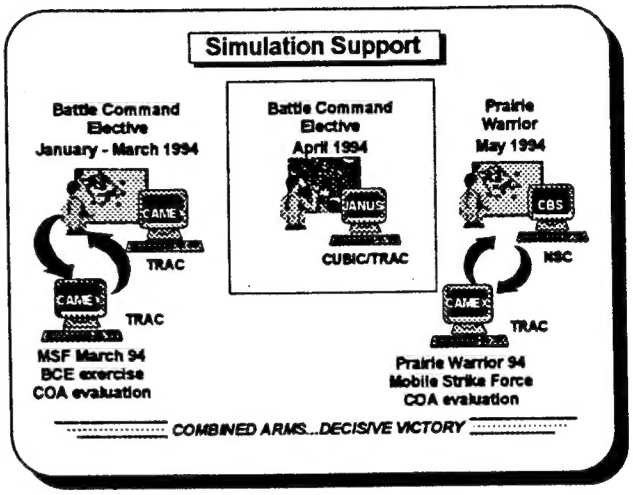
Linking Training Exercises with Combat Developments



In a recent LAM study, TRAC explored the idea of using a training exercise as a basis for a combat developments scenario to investigate modernization issues, with some significant lessons learned on the process called "model-exercise-model" (M-E-M). This process nominally includes the use of a combat simulation to assist in fine-tuning exercise parameters; conduct and observation of an exercise; and replication of the exercise outcomes in the combat simulation for further investigation of alternatives. The planned use of the MSF in Prairie Warrior as an experimental force mirrors some aspects of the M-E-M process. The April AWE, using archived NTC rotation data loaded into JANUS, is an example of portions of the iterative process. A critical finding of the research highlighted the need to develop the warfighter prior to the exercise, across the

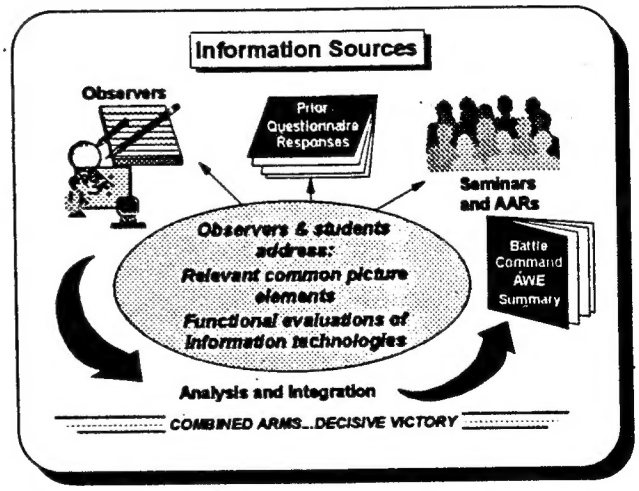
TRADOC domains of doctrine, training, leader development, organization, materiel, and soldier systems (DTLOMS). This is particularly key for the MSF staff, given a new organization, new combat systems and information technologies, developing doctrine, and leaders with little depth in division staff experience. While the BCE serves as an interim vehicle for this crucial development process, the initial course objectives had to be adjusted to allow student exposure to domains outside of BCBL's area of interest. This was especially true during the April AWE, which included a seminar on fighting with the MSF. As an objective capability, other Battle Labs must make a similar investment in development of these future warfighters within their areas of interest.

Simulation Support



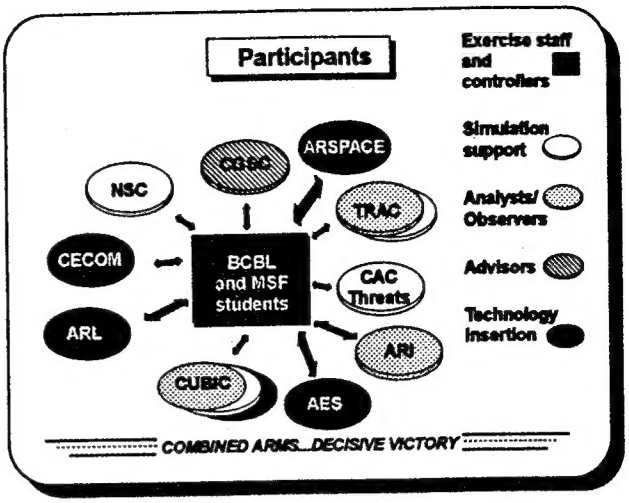
Three simulation drivers are used in the experiments. The Computer-Assisted Map Exercise (CAMEX) model, developed and operated by TRAC, provided the exercise driver for January and March. It will also be used for a course of action (COA) evaluation tool in May, as it was in March. In April, the JANUS model was used in conjunction with data archived from an NTC rotation depicting a brigade-level operation. Operators were provided by CUBIC Applications (formerly TITAN) for the April exercise, with the simulation inputs built by TRAC's Monterey office. During the May experiment, the Corps Battle Simulation (CBS) provided by the National Simulation Center (NSC) will be used as the MSF students join the rest of the CGSC students for Prairie Warrior.

Information Sources



For the April experiment, two principal sources of information were used, exercise observations and seminar discussions. Additionally, warfighter results, though not the primary focus, were also considered to develop insights. During this AWE observers used TRAC-developed data collection guides as an orientation tool to focus the capture of source, information type, content, recipient, means of transmission, and use of information shared among the warfighters. These data collectors provided both specific and general observations about the exercise; the general observations were used to build the after-action review (AAR) and to address secondary experiment objectives. A second source of information was discussions during BCE seminars. The AAR provided a means of integrating insights and observations from all participants.

Participants



The April experiment was again conducted by BCBL's Experimentation Division. BCBL project officers designed the experiment, developed the structure for each class meeting, coordinated all support requirements, served as controllers for the exercise, and facilitated seminars and discussions. As indicated above, CGSC supported the exercise with student participants, and also provided instructors to assist BCBL with doctrinal issues, staff procedures, and educational and administrative requirements for the BCE. Analysis and simulation support was provided by TRAC, and the Army Research Institute (ARI) also conducted analysis for BCBL. CUBIC provided integrating support under a contract with BCBL, including observation support, simulation support, and technology insertion. They also prepared and facilitated the AAR. NSC provided facilities for the experiment. Communications and Electronics Command (CECOM) assisted BCBL with identification and integration of information technologies in the experiment. Combined Arms Command (CAC) Threats represented the opposing force (OPFOR) for the April experiment. The Army Tactical Command and Control System (ATCCS) Experimentation Site (AES) assisted in the data collection effort with technicians and recording equipment for video, audio, and computer monitoring. Finally, U.S. Army Space Command (ARSPACE), Army Research Laboratory (ARL), and several other Army Research, Development and Engineering Centers (RDECs), laboratories, and defense contractors provided prototype systems and systems support to allow exploration of information technologies to enhance battle command.

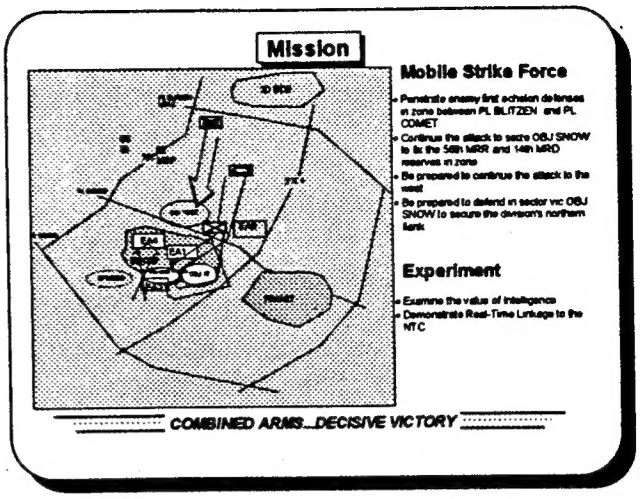
April Experiment

The remainder of this report specifically addresses the April experiment -- its characteristics and results, and a summary of insights. The BCBL project officer for the April experiment was MAJ Robert Chipp.

Mission

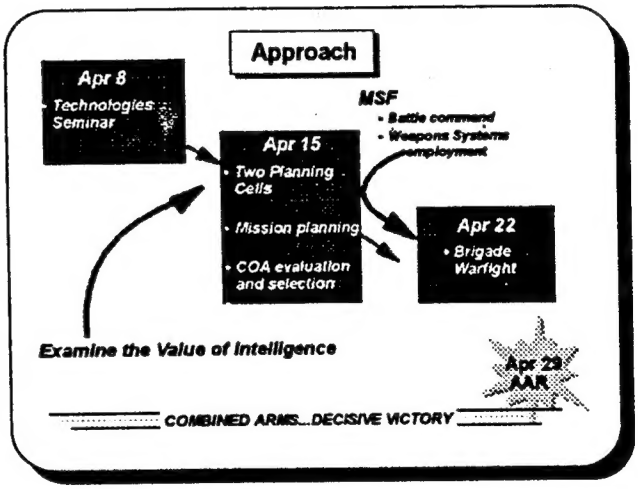
During April the BCE students operated as the command and staff of the 2nd Brigade, 52d MSF. As part of 10th US Corps the MSF conducted a penetration to restore the International Boundary in the corps zone. The brigade's warfighting mission was to:

- On order, link up with 3-206 FA (Paladin) at Contact Point 1.
- Accept DS 3-206 FA (Paladin) upon linkup.
- Attack 110600 DEC 9x to penetrate enemy first echelon defenses in zone between PL BLITZEN and PL COMET.
- Continue the attack to seize OBJ SNOW to fix the 56th MRR and 14th MRD reserves in zone.
- Be prepared to continue the attack to the west.
- Be prepared to defend in sector vicinity OBJ SNOW to secure the division's northern flank.



On the experiment side, the April AWE had two significant new purposes. The first purpose was to examine the value of intelligence. The second purpose was to demonstrate a live-link capability with the NTC.

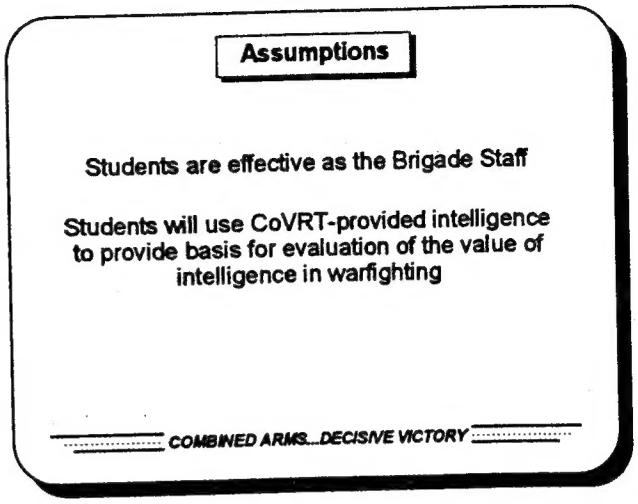
Approach



The first BCE meeting was 8 April 1994, a four-hour class day. Technology seminars introduced the BCE students to systems for weather analysis, intelligence, terrain visualization, and planning, as well as JANUS, the exercise driver. BG (RET) Wass de Czege gave the 52nd MSF commander's intent and brigade planning began. The second BCE meeting was held on 15 April 1994, a six-hour class. A seminar was conducted on how to fight with the MSF. Then students conducted planning to develop three COAs in each of two equivalently staffed planning cells. The difference between the cells was that one had the Commander's Visualization Research Tool (CoVRT) and the other did not. CoVRT provided access to the raw intelligence data captured during NTC rotation 93-04 (Operation Desert Capture (ODC) I). The purpose of this was to examine the value of intelligence and the value of raw imagery to field commanders. A hypothesis had been made that commanders wanted access to real-time imagery to support decisionmaking. The impact of CoVRT will be discussed later in detail. The third day, 22 April 1994, was an eight-hour class. During this time, the students received a situation update, modified their plans, and conducted the brigade fight. Battle results were briefed to the students on 29 April 1994, in an inclusive AAR which was the culmination of the BCE course hours. BCBL personnel again served as controllers. During all battle planning and execution sessions, a team of observers from TRAC, ARI, and CUBIC collected data on the

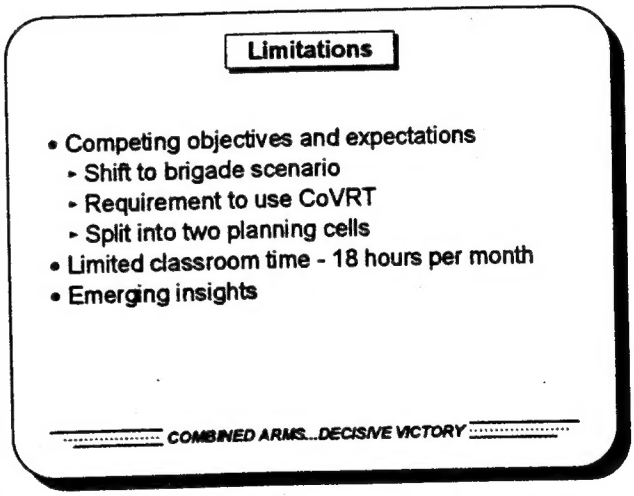
information as described earlier. Each observer was assigned to a principal Battlefield Operating System (BOS) and location (brigade forward, brigade rear, or battalions). There was also a principal evaluator assigned to each system brought in to the BCBL during the AWEs.

Assumptions



Across all of the Battle Command AWEs, the ability to identify elements of the RCP hinges on the ability of students to project themselves as future senior leaders and envision future warfighting and information requirements. Further, in this AWE they have to do it in a brigade context, in contrast to the prior two AWEs. To evaluate this assumption, RCP elements developed through the AWEs were compared with commander's critical information requirements (CCIR) developed in 1985 with then-active Army division and corps commanders; students also provided a ranking of those CCIR. There was no statistical difference in the rank ordering of the elements between the two sets. Thus, the assumption that the BCE students can act as future Army leaders seems reasonable. To examine the value added by intelligence, as provided by CoVRT, there was a major assumption made that the students would seek this additional intelligence in the planning process and choose to use CoVRT to access it.

Limitations



As a pilot program, the BCE has required modifications to enhance its usefulness. Both student participants and the entire experimentation team have discovered better ways to structure and conduct the process. The process must accommodate these changes, recognizing that analytic rigor competes with other objectives. Assumptions are challenged, new questions are asked, and in the course of adjusting to these influences, the process reaches a point where the experiments are better characterized as case studies. The April exercise again highlighted some areas where information technologies have the potential to improve battle command capabilities, but changes in key areas again caused a loss in continuity across the exercises. However, there is a synergistic effect from examining all the AWEs together to accurately determine the most significant findings, insights, and answers to the LAM and BCBL issues. The hours devoted to this elective are high compared to other CGSC electives, but are restrictive in consideration of the range of expectations for the MSF and the potential experimentation objectives. A possible solution may be to incorporate a new technologies

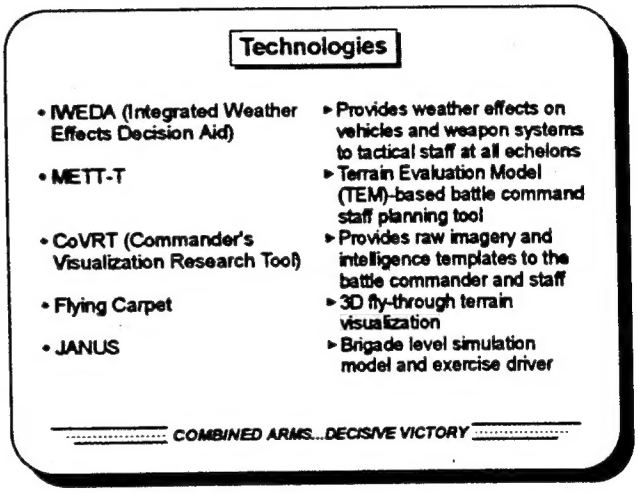
elective and an advanced tactics elective with the BCE in future iterations. CGSC and BCBL are exploring other options as well.

Structured Observations

During the April AWE observers collected data by direct observation in the warfighting cells each week and by AES-supported remote video monitoring of the warfighters on 22 April. Data were recorded in the form of notes. Observers were focused in their data collection effort by two TRAC-developed data collection guides. One of the guides was oriented on functions and tasks defined by the TRADOC Blueprint of the Battlefield, while the other was oriented on specific questions the BCBL developed to address their AWE objectives and the LAM Issue, Holistic Review of C4I. In addition to the structured observations, the TRAC data collectors provided brief summaries of BOS issues and insights, and data for evaluation of system capabilities for the AAR. Observers also wrote a summary of their overall impressions of the exercise, highlighting any further areas to be modified for next year's experiments and Prairie Warrior, and providing any emerging insights on the RCP issue.

Seminar Discussions

The technology seminar held during the April experiment introduced students to several battle command support systems with varying functions, shown here. A seminar was conducted to introduce the BCE students to evolving concepts of how to employ the MSF. How to fight with the MSF was presented in terms of a four phase battle including preparation, attack, maneuver, and regeneration. The key concepts for this force are lethality, survivability, and tempo.



Warfighting Insights

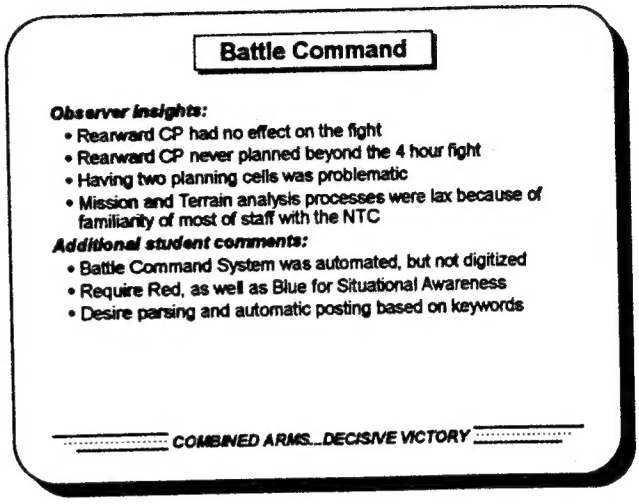
As mentioned, warfighting results were not the principal focus of the experiment. However, several factors, shown below, proved to be difficult for students to overcome during the experiment.

- Suppression of enemy air defense (SEAD) ineffectiveness
- Reconnaissance and surveillance (R& S) inadequacies/vulnerability
- Indirect fire support ineffectiveness
- Helicopter vulnerabilities

AAR

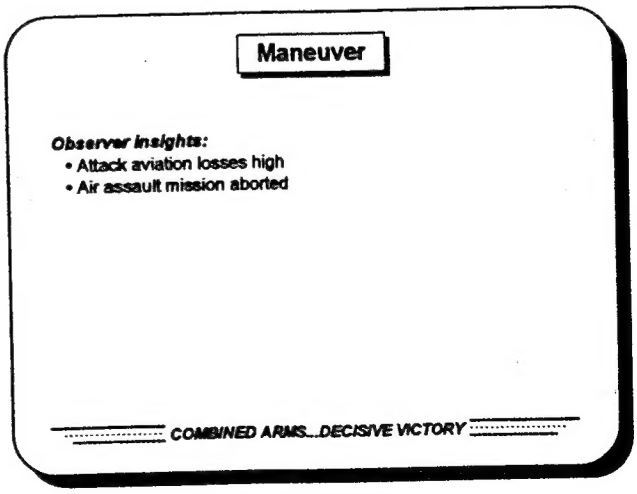
Insights from all sources were merged to provide an AAR for student participants. The AAR was intended to provide feedback to the students on battle outcome and staff procedures, and to stimulate discussion among students, BCBL controllers, and data collectors/observers regarding the exercise, the RCP elements, and the art of battle command. As in previous AWEs, a summary of insights was prepared for each BOS and battle command support system component.

Battle Command



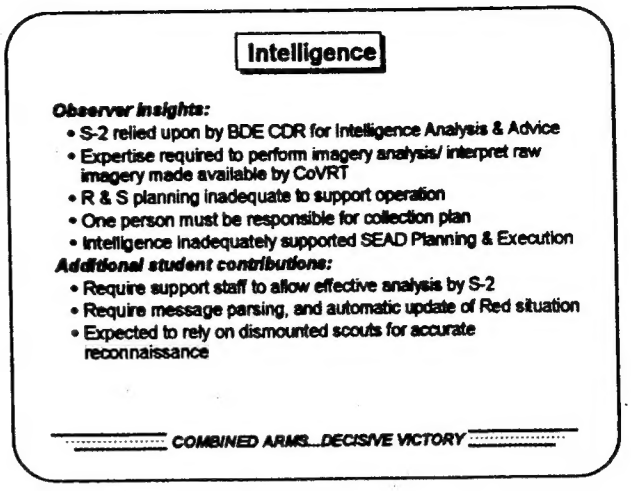
The staff again experienced great difficulty in updating the status of friendly and enemy forces, related to the lack of true digitization in the suite of systems which will be discussed later. Automatic message parsing and posting routines would mitigate some of these problems. The rearward CP had no apparent effect on the course of the four hour battle. Further, although they had been directed by the assistant S-3 at the beginning of the fight to use the available electronic status system to perform future planning, no planning occurred in the rearward CP for any time beyond the four hour fight. Regarding planning, the flow of the entire planning phase was adversely disrupted by the split of the BCE students into two planning cells to examine the value of intelligence. The method used to address this experimentation objective resulted in diminished staff effectiveness. Also during the planning phase, it was noticed that several aspects of the decisionmaking process were approached rather haphazardly. Prominent among them was terrain analysis and all the steps to which it applies. The cause of this laxity was the familiarity the majority of BCE students had with the NTC terrain. Thus, both physical geographic settings employed in the AWEs (NTC and SWA) have not demanded the performance of rigorous terrain analysis in the decisionmaking process (NTC because of familiarity, SWA because of relative lack of relief).

Maneuver



Both the use of aviation attack assets and air assault forces were stymied in the exercise, leaving large gaps in the brigade's maneuver capability. This, coupled with shortcomings in the RCP and intelligence collection management, left students with few good maneuver options.

Intelligence



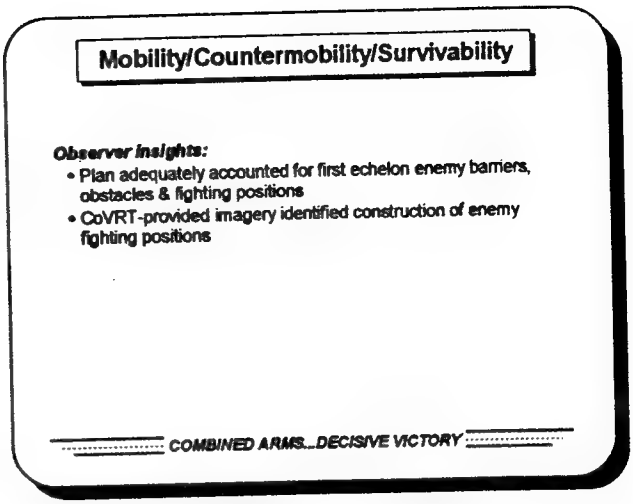
The primary new experimental objective of this AWE was to determine the value of intelligence. As previously stated, to accomplish this objective the BCE was split into two planning cells to perform the operational planning. The difference in the two groups was the presence in one of CoVRT, which provided assessed intelligence in the form of various intelligence templates as well as raw imagery and other intelligence data. When CoVRT was used to show moving target indicator (MTI) data from JSTARS to the Brigade commander at the initiation of planning, he turned to the S-2 and directed him to interpret what the display meant. Unfortunately, the S-2 demonstrated clearly why there are experts established to analyze each intelligence discipline, as he stated he didn't know what the JSTARS display meant. A consensus was reached by the staff by the end of the exercise on the CoVRT experiment. It was:

- Special expertise gained through education, training, and experience is required to plan collection, and process and analyze data in each intelligence discipline. This is especially true in the broad discipline of imagery intelligence.
- Accurate imagery analysis is only performed in context (of the knowledge of target signature effects, the enemy force, and the situation)
- An available intelligence data base from which confirmatory data can be "pulled" is useful to the commander
- Raw imagery and other intelligence data will not be useful "pushed" to the commander without analytic support and out of context

Collection planning was approached doctrinally in the AWE; however, because of the lack of support staff there was an inadequate collection plan. There was also an inadequate R & S plan and overlay which contributed to the ineffective use of scouts in the exercise. Although not required there was no IEW synchronization matrix produced to mitigate the problem of asset management. There was some lack of cohesion regarding who was in charge of and responsible for collection management. However, all these problems regarding collection management were the result of the lack of intelligence support staff and opportunities to train as a unit. During the battle the intelligence system failed, for various reasons, to adequately support SEAD planning and execution. The result was intolerable losses of helicopters. The staff did attempt to integrate various systems to execute effective SEAD, but the Blue force failed to locate a significant part of Red ADA assets in a timely manner.

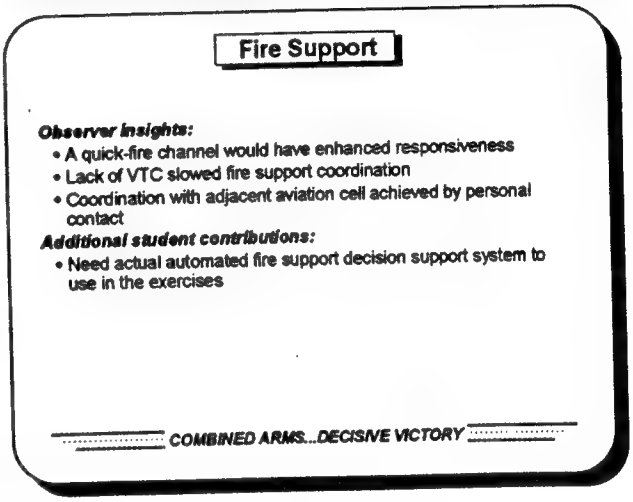
Mobility/Countermobility/Survivability

The Brigade plan adequately accounted for Red barriers, obstacles, and fighting positions. The situation template provided good detail on these engineering factors and CoVRT provided some excellent imagery of them. CoVRT also provided excellent video-recorded data of fighting positions being constructed by Red engineers.



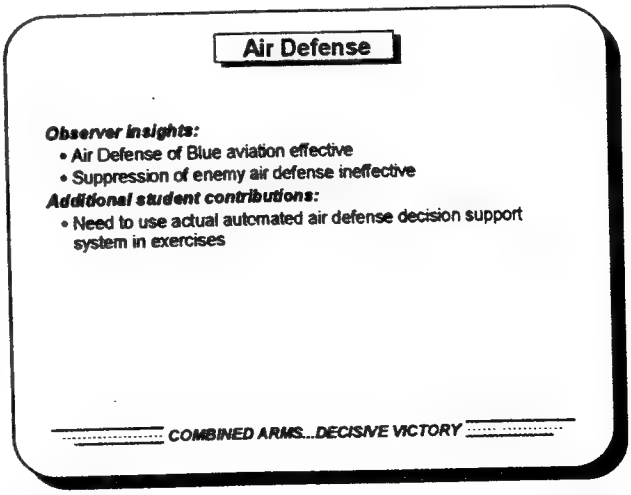
Fire Support

Fire support would have been greatly enhanced by the presence of any of the automated fire support decision support systems (TACFIRE or AFATDS). Because the fire support officers are used to working with their own systems, they have been hamstrung by the lack of automated support or by the presence of automated "work-arounds." The lesson has been evident - when there is an effective, functioning, decision support system in usage in the Army, it should be used to support the AWEs as part of the established baseline. This battle demanded highly responsive fire support - the system lacked the required responsiveness several times. The lack of a quick-fire channel contributed to this shortcoming. Overall fire support coordination was slowed to some degree by the lack of VTC in the cell. Coordination was very timely with the Aviation cell, but this was because the two cells were contiguous and face-to-face coordination was effected with moving.



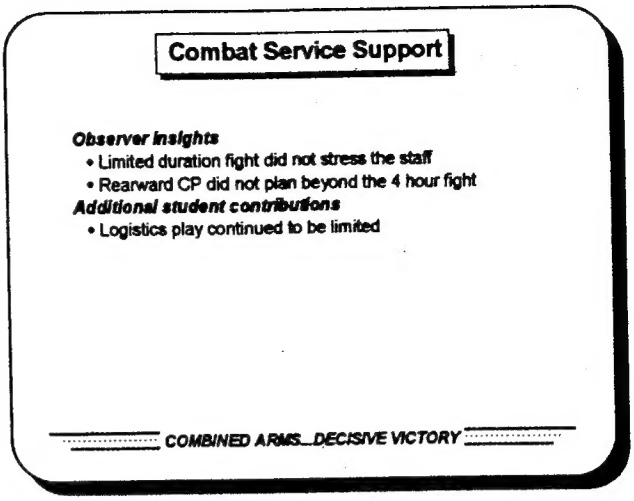
Air Defense

The air defense of Blue battlespace and assets was adequate. The suppression of enemy air defense (SEAD) was ineffective. Many of the Red ADA assets were not located or identified during the battle and this resulted in a significant loss of Blue helicopter assets. The Air Defense Officer might have been able to contribute to SEAD planning had there been a full air defense support staff present. This area would also have been enhanced by the use of any ADA decision support systems (e.g., FAADC2I) available in the Army.



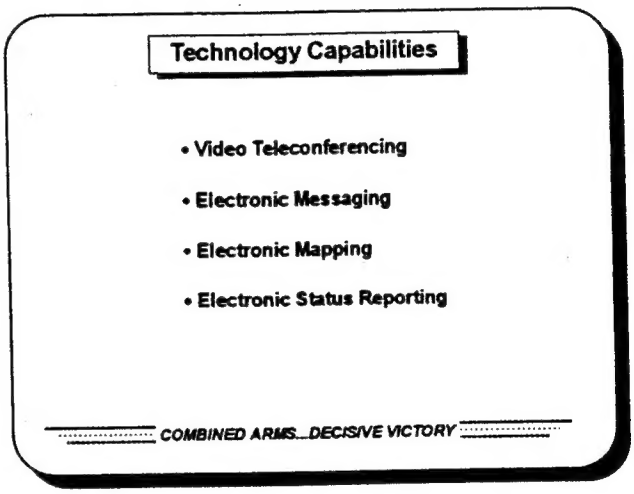
Combat Service Support

Again in this AWE, the exercise did not provide an adequate catalyst to spark activity in the CSS area. Given the limited duration of the brigade fight, there was no detailed casualty reporting, replacement activity, estimates of supply class usage or forecasts, or cross leveling of units based on losses. There continued to be a lack of understanding of appropriate reports and actions, complicated by another unfamiliar force structure and future systems. Thus, there was inconsistency within this area from both an event-driven and a time-driven perspective. More staff, trained for a longer period of time to ensure cohesion, were needed to work the various areas of CSS.



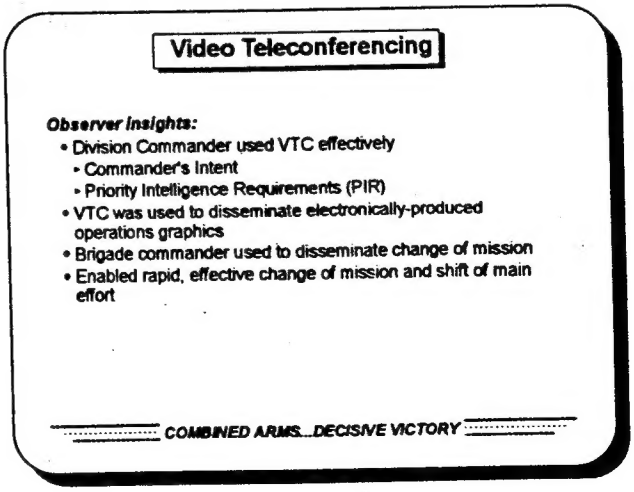
Technology Capabilities

During the April AWE the BCE used information systems representing the four technology areas - video teleconferencing (VTC), electronic messaging (e-note), electronic mapping (CoVRT, MSI, MPRS, METT-T, MapInfo (Battle Command Planning System), Flying Carpet), and electronic status reporting (Battle Command Decision Support System). Telephones, facsimile, and assorted *Windows*-based applications on PCs continued to be available as part of the battle command support system. The BCE was also introduced to the JANUS simulation model usable as an exercise driver, COA analyzer, and situational awareness tool, as well as a combat developments model.



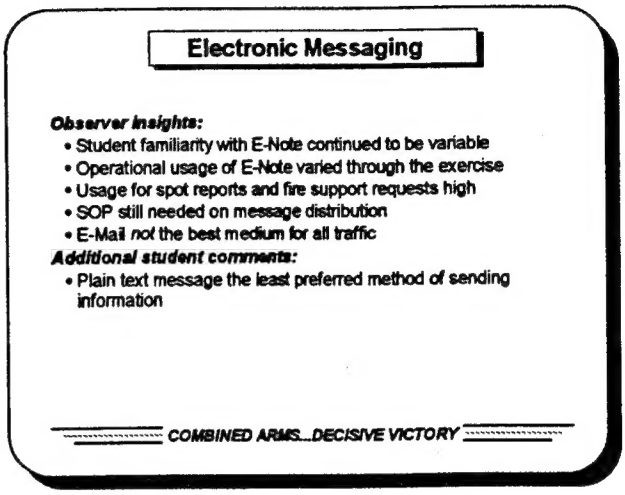
Video Teleconferencing

During the April AWE, BG (RET) Wass de Czege used VTC to present the MSF Commander's intent to the Brigade command and staff. This was a very effective means of ensuring all key planners had a common understanding of the mission and the initial guidance for the brigade to accomplish it. The tool enabled him to clearly articulate the initial priority intelligence requirements (PIR) to the entire BCE. This helped to further develop a



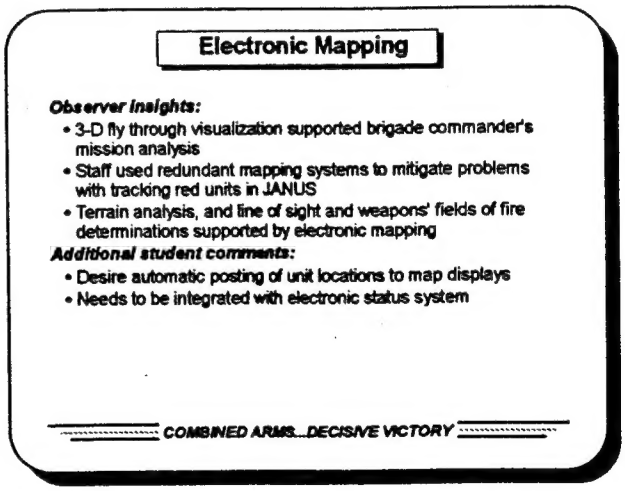
shared understanding of the common picture. VTC is the tool which provides electronic, virtual co-location of personnel. Thus, VTC provides a means for the face-to-face communication which the BCE has indicated is the preferred means of assured communication between command and staff personnel. Beyond the use of the tool for face-to-face communications, the VTC has been employed several times to disseminate operations graphics to remote cells. Where seamless electronic dissemination of displayed information is not possible, the use of the small VTC camera directed at the screen has proven an interim solution.

Electronic Messaging



During the April AWE the use of electronic messaging reinforced several recurring insights. Unit tactical SOPs must be developed for emerging battle command doctrine and information technologies. The command and staff must train together long enough to ensure cohesion. The optimal usage of new information technologies cannot be accurately predicted and evolves during this type of exercise. Thus, as new information technologies are brought into the evolving battle command support system, AWE type experimentation and training exercises will be required to effectively integrate them into the total system.

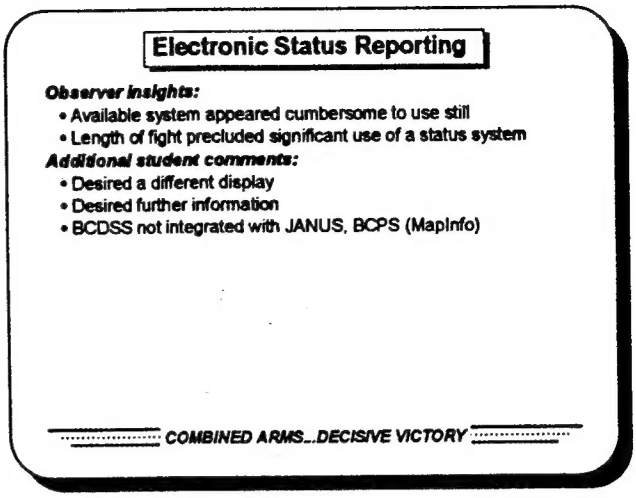
Electronic Mapping



Mapping is the fundamental basis of any battle command support system, whether analog or digital in nature. During the April AWE the manifestations of electronic mapping to support battle command were both larger in number and greater in scope. The most significant extension of electronic mapping was the 3D "fly-through" terrain visualization provided by the Flying Carpet system. The prototype system required too much hardware to be employed in a highly mobile CP at division or below. However, it demonstrated that the virtual co-location of a commander or staff to any geographic position on a battlefield is a powerful analytic and decisionmaking support tool. To fully exploit the potential of such a concept, automatic posting of unit and system locations and status is required. Further, the depiction of operations graphics is required even in a system such as Flying Carpet, which presents representations of all combat systems on the battlefield. The AWE again demonstrated that only true digitization with a seamless battle command support system will represent an optimal solution for this problem. Such a system would include automatic updating of changing locations and status throughout all integrated systems.

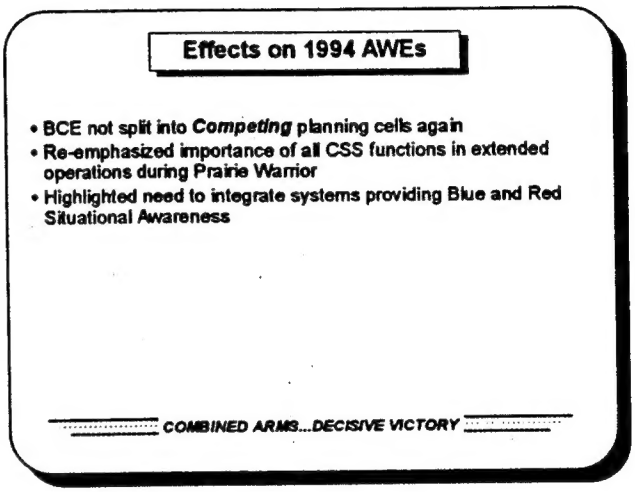
Electronic Status

The April AWE again demonstrated that the available electronic status system does not satisfy objective requirements. The system has been more useful as training opportunities have increased. However, because the system is not integrated digitally with the remainder of the experimental battle command support system, it does not support a highly mobile force in a short duration, close fight. Thus, the current electronic status system does not represent the objective system.



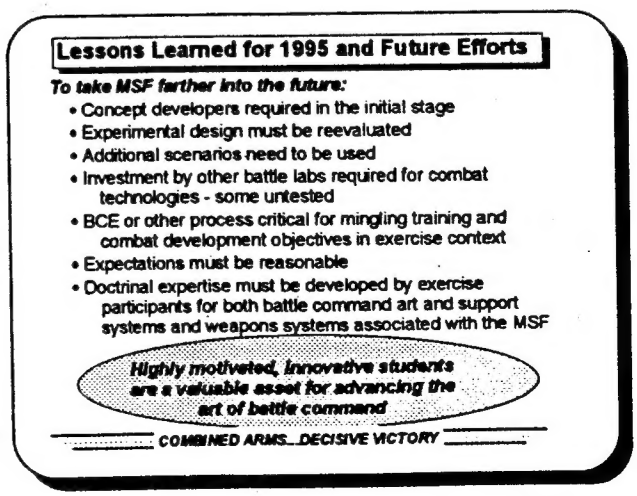
Effects on 1994 AWEs

The effects of the April AWE on other events involving the 1994 BCE were limited to Prairie Warrior. There was never a plan to do so, but the experience in the April AWE clarified the problems caused by splitting the BCE for experimental purposes. The biggest problem with this was the limited number of personnel in the course, and thus, the limited staffing which could be accomplished with the class. Throughout the AWEs the need to stimulate the CSS staff was demonstrated. One reason to do this is to ensure that the students remain motivated in the BCE. However, more importantly we need to examine the CSS area in the same way we have the combat and combat support areas regarding battle command and the battle command support system. The April AWE highlighted the need to better integrate those systems providing Blue and Red situational awareness. This was an important concept for the Prairie Warrior exercise as the battle command support system, not being completely digitized, has the potential to adversely affect staff performance if the level of integration is very low.



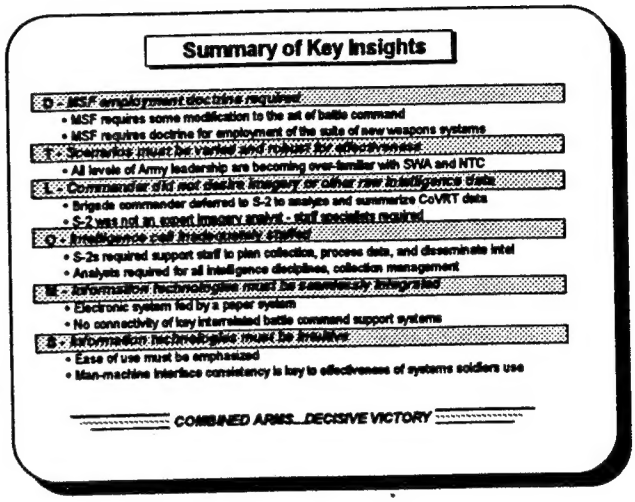
Lessons Learned for Future Efforts

The April AWE again demonstrated several points important to improving subsequent years' efforts. The first of these is that to examine new battle command concepts it is imperative to integrate relevant concept developers into the experimental process early and to fully educate everyone involved in the AWE (including controllers, observers, and players) with the new



concepts. Second, much more emphasis must be placed upon the experimental design aspects of the entire AWE process. The lack of true experiments (primarily due to lack of control groups) have precluded many conclusions drawn from the AWEs from being definitive and defensible. In the area of experimental design, the AWEs to date have shown that staff must be available within the BCE to work all functions required in the exercises. That is, if a function such as intelligence collection management requires a person full time in the exercise, it cannot be evaluated accurately if it is one of several functions performed by one of the staff. Further, the BCE students' expertise (represented most clearly by branches and specialties) must be matched with functional requirements precisely to draw valid conclusions from the experiments.

Summary of Key Insights



The major insight is that doctrine is required for the employment of the MSF. Two aspects to this have affected the performance of the BCE - the subtle modifications required in the art of battle command, and the large changes required by the suite of future weapons systems organic to the MSF. Doctrine and tactics, techniques, and procedures (TTP) must be developed to encompass both these aspects to make this force effective. Regarding training, a surprising insight was clearly revealed this AWE. The familiarity of a large portion of the officer corps with two principal areas in the world has seemed to affect staff work in training exercises. The two areas are the NTC (from training rotations) and the Southwest Asia area (from our deployment and the proliferation of work since 1991 using scenarios based on the area). The effect has been to introduce laxity (in the command decisionmaking process) and to disrupt staff synchronization. Further, these scenarios do not provide terrain which is conducive to the investigation of either optical or electronic line-of-sight issues, or electronic mapping systems. The insights classified as leader and organizational in nature both emanated from the experimental objective of determining the value of intelligence. First, it was clearly demonstrated that the commander in this AWE did not desire raw imagery or intelligence data of any type, but chose to rely on his primary staff to advise in this area. He was, however, very satisfied with templates which were produced and displayed by the system provided the raw data. Additionally, it was demonstrated that imagery analysis requires a high level of expertise and a strong contextual orientation. A very proficient military intelligence officer was not able to simply look at JSTARS-provided MTI data (dots on a screen) and tell what it meant. The importance of providing skilled analysts for all intelligence disciplines to provide data to the exercise cannot be overemphasized. Also, as previously stated, adequate staff must be provided to work all the functions required in the exercises. Finally, the insights in the areas of materiel and soldier systems both relate to fully meeting objective requirements for a truly digitized battle command support system. Among other things, this system must be completely and seamlessly integrated, be supported by assured communications, and provide a continuously updated consistent common picture (Blue and Red situational awareness), readily usable by a trained force.